299-E33-73 (A6881)

Log Data Report

Borehole Information:

Borehole:	299-E33-73 (A6881)		Site:	216-B-8 Crib Tile Field	
Coordinates (WA State Plane)		GWL (ft)[1]:	Not Reached	GWL Date:	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
137,493 m	573,791 m	Jan. 1948	635 ft	150	Unknown

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel Welded	2.15	8.725	8.0	0.3725	+2.15	146

Borehole Notes:

The logging engineer measured the stickup using an engineer's tape. Stickup was measured between a painted spot at the top of the casing and an engraved "X" at the base of the casing. In this case, the TOC elevation (HWIS[3]) was assumed to refer to the painted spot at the top of the casing. Casing bottom and total depth (TOC reference) are reported from information provided in Chamness and Merz (1993).

Logging Equipment Information:

Logging System:	Gamma 2B		Type:	SGLS (35%)
Calibration Date:	11/01	Calibration Reference:	GJO-2002-287-TAR	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	Repeat	
Date	01/25/02	01/28/02	01/29/02	01/29/02	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	2.5	147.0	54.0	41.0	
Finish Depth (ft)	41.0	52.5	26.0	26.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	N/A[4]	N/A	N/A	N/A	
Pre-Verification	B0066CAB	B0068CAB	B0069CAB	B0069CAB	
Start File	B0067000	B0068000	B0069000	B0069026	
Finish File	B0067077	B0068189	B0069025	B0069056	
Post-Verification	B0067CAA	B0068CAA	B0071CAA	B0071CAA	
Depth Return Error (in.)	0	+1	0	0	

Log Run	1	2	3	Repeat	
Comments	No fine-gain adjustments made.	Fine-gain adjustment made.	Fine-gain adjustment made.	Repeat section is 26-41 ft.	

Logging Operation Notes:

Zero reference is the top of casing.

Logging was performed with the centralizer on the sonde. During logging run 2, 01/28/02, fine-gain adjustment made after files B0068007, -014, and -025. During logging run 3, 01/29/02, fine-gain adjustment made after file B0069010. Moving to borehole 299-E33-79, file name B0070, after completion of logging this borehole.

^{137}Cs was detected from the ground surface to 6.5 ft and between 20 and 57 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	02/07/02	Reference:	MAC-VZCP 1.7.9 Rev. 2

Pre-run and post-run verification spectra were collected at the beginning and end of each day. For logging runs 1 and 3, the recorded peak counts per second (cps) for the 609-keV peak, 1461-keV peak, and 2615-keV peak were about 6 percent lower each day in the post-run verification as compared to the pre-run verification. All of the verification spectra were within the control limits except for file B0068CAA, which was recorded at the end of logging run 2. The recorded peak counts per second (file B0068CAA) for the 609-keV peak was less than 10 percent of the pre-run verification spectrum (file B0068CAB). Examinations of spectra indicate that the detector appears to have functioned normally during log run 2, and the spectra are provisionally accepted, subject to further review and analysis. The post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated in EXCEL (source file: G2BNov01.xls), using parameters determined from analysis of calibration data collected in November 2001. Zero reference is the top of the casing. Based on the observations of the logging engineer, the casing configuration was assumed to be one string of 8-in. casing with a thickness of 0.375 in. to a log depth of 147 ft. A water correction was not needed. Dead time corrections were applied when dead time exceeded 10.5 percent. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net count rates.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. A combination plot is also included to facilitate correlation. The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for both the man-made and naturally occurring radionuclides.

Results and Interpretations:

^{137}Cs was detected in significant amounts in this borehole. ^{137}Cs occurred between 20 and 58 ft. In this zone, activities exceeded 1,000 pCi/g in the interval between 24 and 28 ft. The maximum apparent concentration was about 1,400 pCi/g at a log depth of 27 ft. ^{137}Cs contamination was detected near the MDL (about 0.3 pCi/g) at a log depth of 138.5 ft and in the interval from 82 to 95 ft. A zone of ^{137}Cs contamination was detected near the ground surface (log depth 2.5 through 6.5 ft) with activities ranging from 0.2 to 295 pCi/g. At the first station (2.5-ft log depth or 4 in. below the ground surface), ^{137}Cs activities were about 200 pCi/g. This near-surface contamination may become exposed or mobilized by wind erosion.

Recognizable changes in the KUT logs occurred in this borehole. Above the zone of intense gamma-ray activity, apparent ^{40}K activities are about 13 pCi/g. Within the zones of intense gamma-ray activity, apparent ^{40}K activities are about 17 pCi/g. The relatively high concentrations of ^{137}Cs below about 23 ft may correspond with the increase in ^{40}K activities and the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2. The 15-cps increase in total gamma at log depths 114 through 117 ft is attributed to about a 0.4-pCi/g increase in apparent ^{232}Th activities in the same interval.

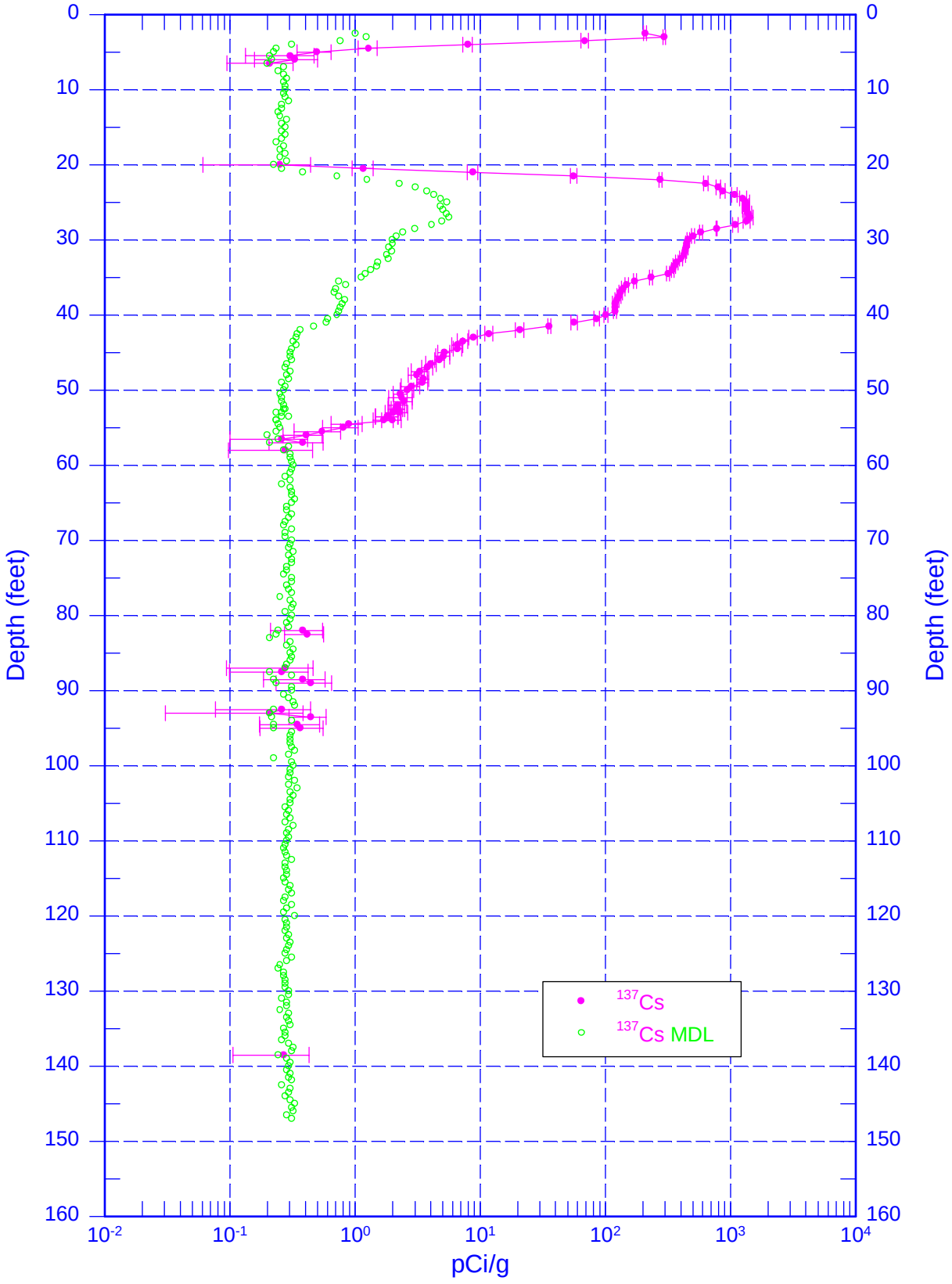
References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

---

[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

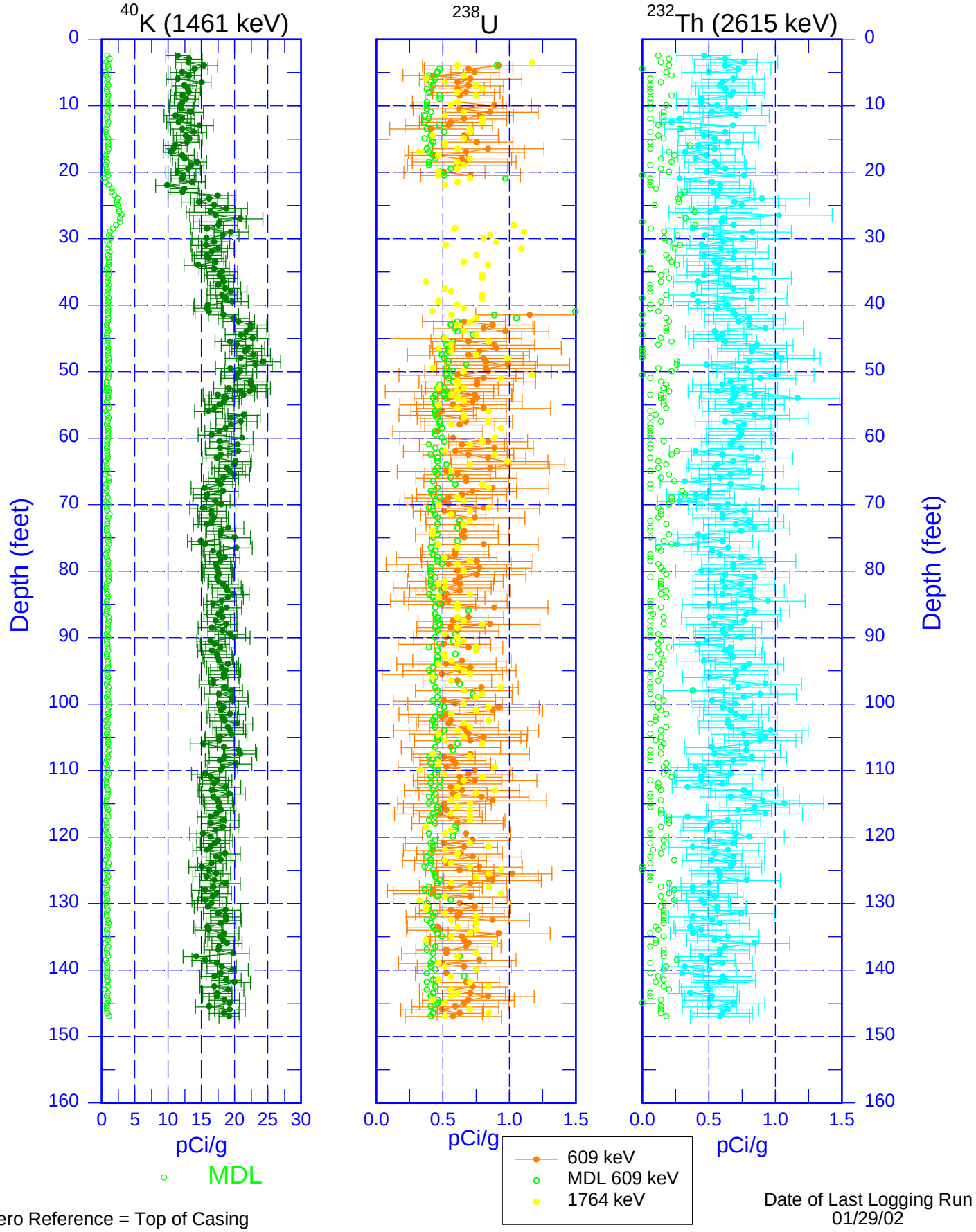
299-E33-73 (A6881)
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02

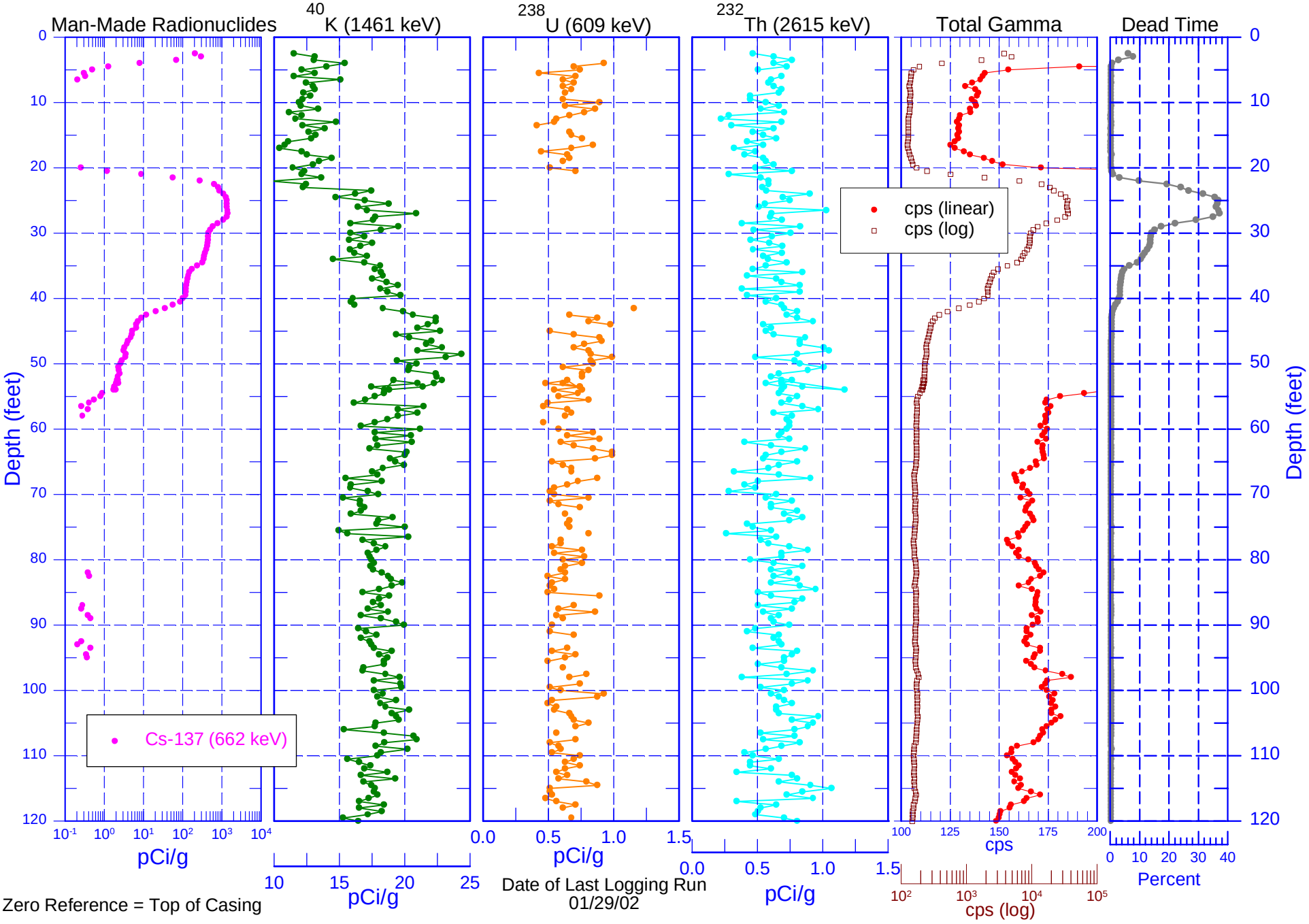
299-E33-73 (A6881)
Natural Gamma Logs



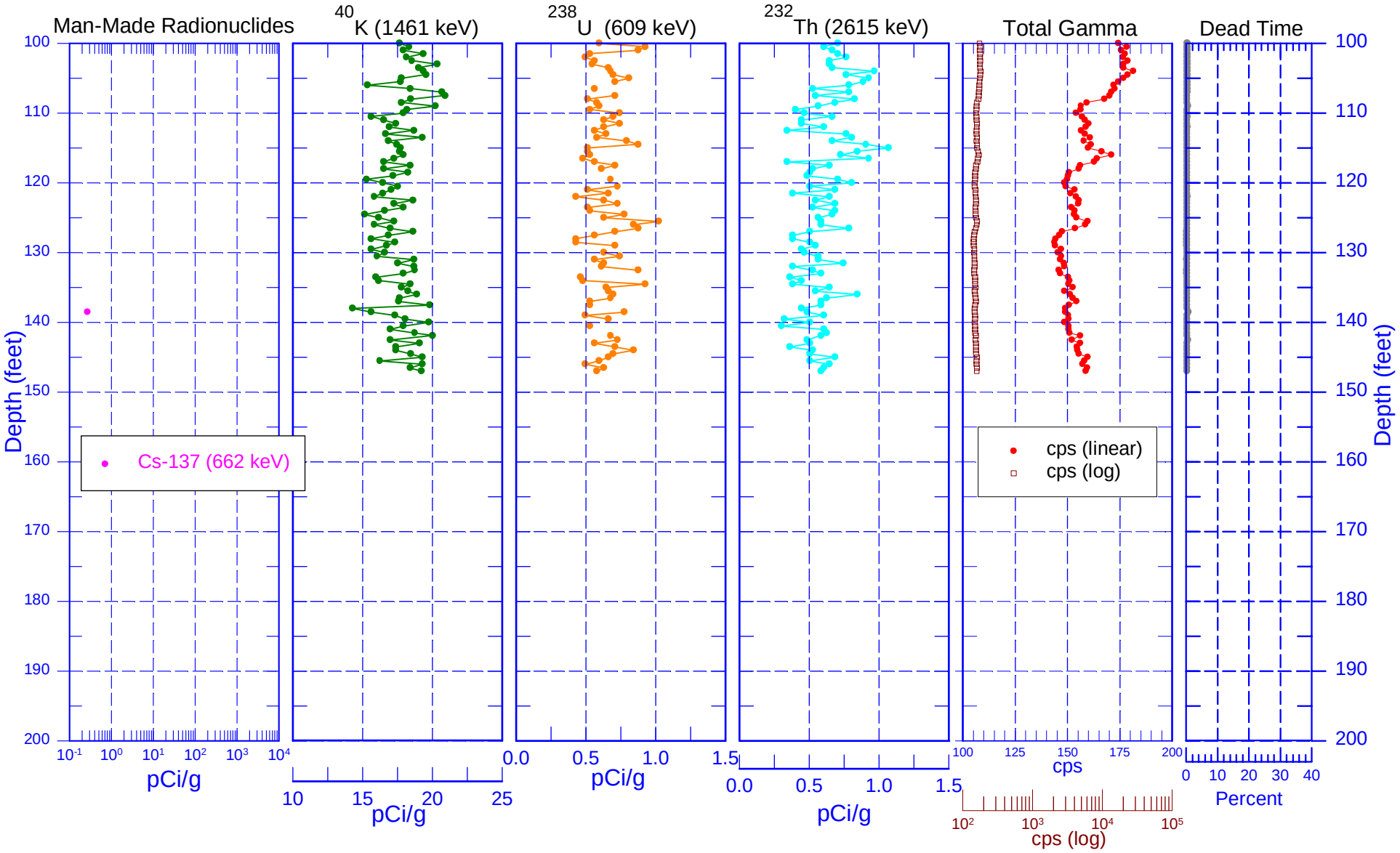
Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02

299-E33-73 (A6881) Combination Plot



299-E33-73 (A6881) Combination Plot

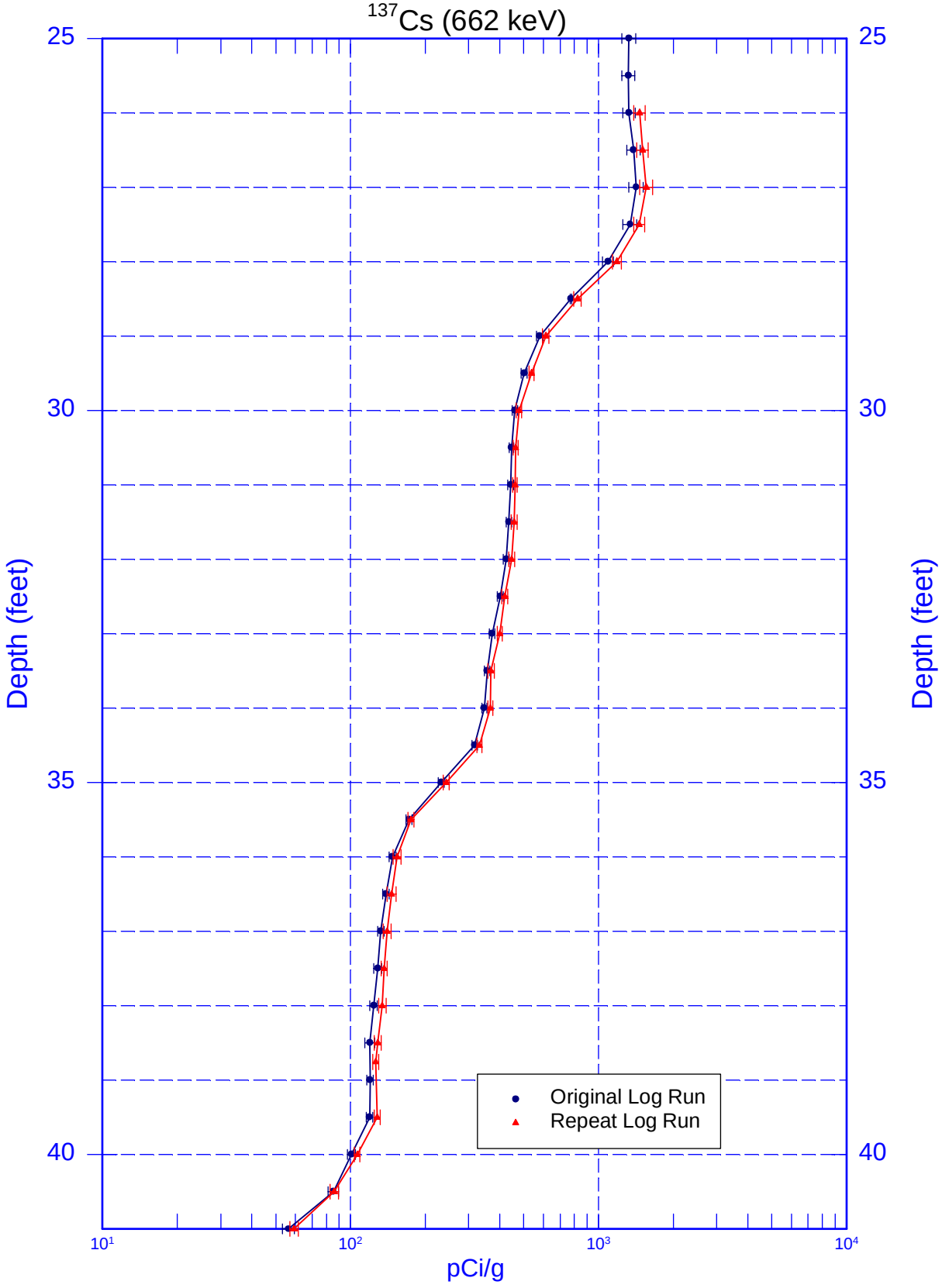


Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02

299-E33-73 (A6881)

Repeat Section of Man-Made Radionuclides (26-41 ft)

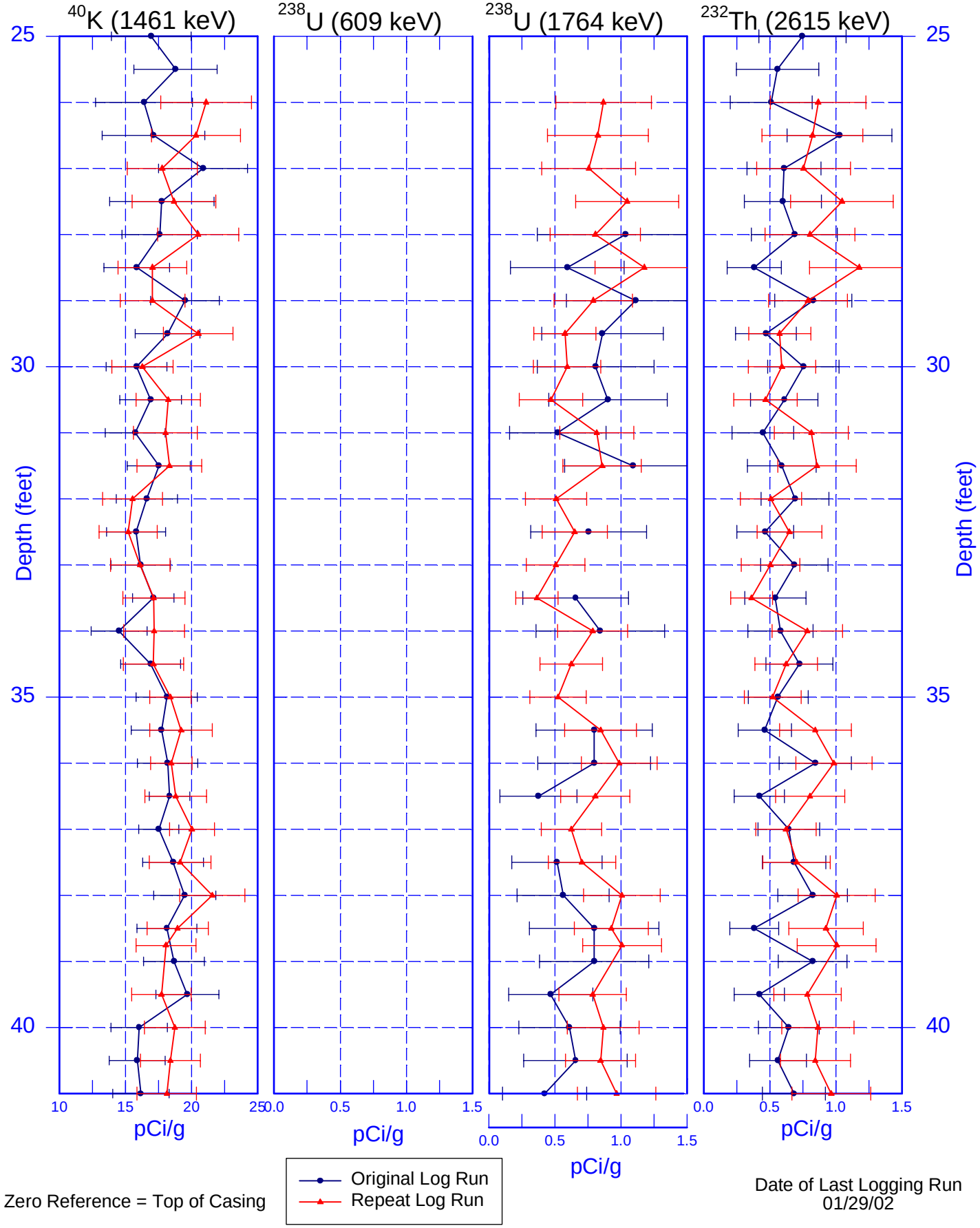


Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02

299-E33-73 (A6881)

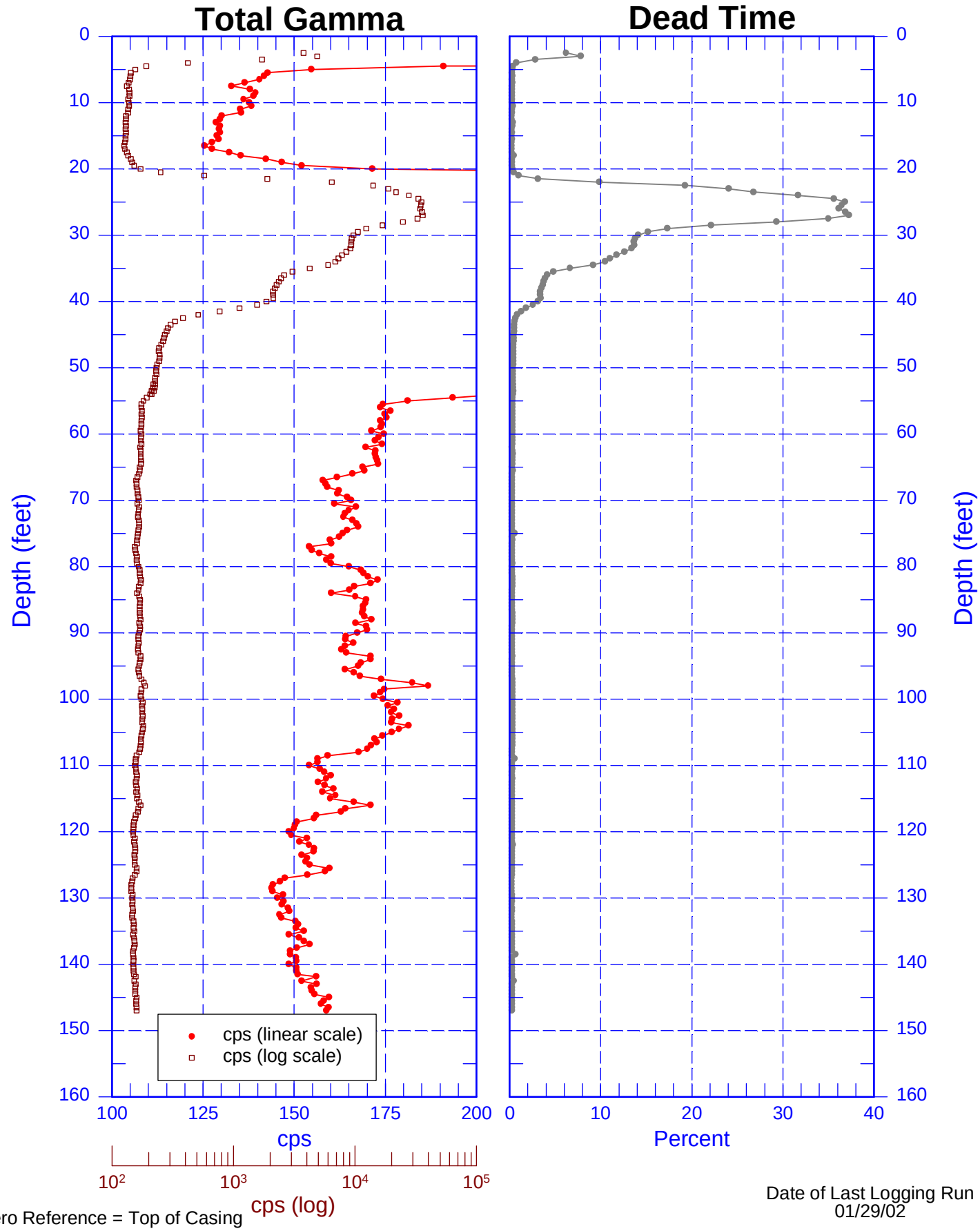
Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02

299-E33-73 (A6881)
Total Gamma & Dead Time



Zero Reference = Top of Casing

Date of Last Logging Run
01/29/02